

### **REMARKS/ARGUMENTS**

Reconsideration of this application is requested. Claims 20, 23, 24 and 26-28 will be active in the application subsequent to entry of this Amendment.

Claims 29-32 were criticized and rejected in items 2-3 of the Official Action. While counsel does not agree with the examiner's comments, for purposes of advancing the examination of this application and examination in general, claims 29-32 have been withdrawn. This action is taken without disclaimer or prejudice to pursuing the subject matter of these claims at a later date.

The balance of the Official Action relates to a prior art-based rejection as set out in items 5 and 6 of the Action. The Examiner rejects all pending claims again, but has changed the primary reference from Hagio et al. (US 4,524,104) to Markusch et al. (US 6,187,892 B1). Applicants traverse this rejection for the reasons that follow and on the basis of the evidence already of record in this application.

**Markusch** et al. discloses, as a contact **adhesive**, a polyurethane/urea composition consisting essentially of a) a polyisocyanate, and optionally b) a polyol component, and c) a polyether containing at least two isocyanate-reactive groups such as an amine-terminated polyether (hereinafter referred to as ATPE) (*see* column 2, lines 27-43 and from column 6, line 53 to column 9, line 3), which may contain one or more catalysts (*see* column 9, lines 11-15).

Although the Examiner alleges that Markusch et al. discloses a suitable catalyst as being acid blocked 1,8-diazabicyclo(5,4,0) undecen-7 in column 9, line 58 to column 10, line 2, Markusch et al. merely discloses that it is possible to use heat-activated catalysts such as acid blocked amines as suitably as free amines mentioned in column 9, lines 37-57, and makes no distinctions between the heat-activated catalysts and the other catalysts mentioned in column 9, lines 16-57 in suitability for use. Besides, Markusch et al. does not mention or suggest what difference the use of a heat-activated catalyst instead of any of the other catalysts would make in any properties of the resulting adhesive.

The object of the present invention is to provide a urethane-forming system curable at ambient temperature, which is useful as a **sealant**. Because Markusch et al. categorizes acid blocked amines such as acid blocked 1,8-diazabicyclo(5,4,0) undecen-7 as heat-activated catalysts and implies that the acid blocked amines need heating in order to serve as catalysts -- as

the term “heat-activated” indicates -- Markusch et al. virtually teaches away<sup>1</sup> from the use of acid blocked amines as a catalyst for a urethane-forming system curable at ambient temperature.

Further, while in the present invention, the acid to block amines is restricted to specific unsaturated aliphatic monocarboxylic acids, Markusch et al. does not disclose any of the unsaturated aliphatic monocarboxylic acids. For example, although Markusch et al. mentions Polycat SA-1 and Polycat SA-102 as acid-blocked versions of 1,8-diazabicyclo[5.4.0]undecene-7 (from column 9, line 66 to column 10, line 2), they are the phenol and 2-ethylhexoate salts of 1,8-diazabicyclo[5.4.0]undecene-7, respectively – as evidence of this *see* the attached safety data sheets from Air Products, and are obviously different from the claimed unsaturated aliphatic monocarboxylic acid salts of 1,8-diazabicyclo[5.4.0]undecene-7. Besides, the catalysts actually used in Examples in Markusch et al. are DABCO® T-12 (dibutyltin dilaurate) and DABCO® 33LV (triethylene diamine in dipropylene glycol), which are totally different from the claimed bicyclic tertiary amine salts with unsaturated aliphatic monocarboxylic acids.

Even more, as a sealant, the urethane-forming system of the present invention is required to be curable at ambient temperature, stay fluid for a while after the ingredients are mixed (i.e. have a long pot life) and show a rapid viscosity increase after expiration of the pot life. In the present invention, to attain curing at ambient temperature, an unblocked isocyanate is used, and in order to attain a long pot life by delaying the onset of the urethane-forming reaction of isocyanate groups, an acid-blocked amine salt is used as a catalyst.

In the polyurethane/urea composition of Markusch et al., a polyether containing at least two isocyanate-reactive groups such as an amine-terminated polyether (ATPE) is essential as the component c). The use of ATPEs in adhesives is known to give the desirable increase in viscosity upon combining the reactive components (column 1, line 59 to column 2, line 8). Thus, the polyurethane/urea composition of Markusch et al. is so designed that the viscosity increases immediately after mixing the components a), b) and c) (column 6, lines 33-36), in contrast to the

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<sup>1</sup> An important consideration in determining obviousness is “teaching away” from the claimed invention by the prior art. *In re Dow Chemical Co.*, 837 F.2d 469, 473 (Fed. Cir. 1988). A reference teaches away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant. A reference will teach away if it suggests that the line of development flowing from the reference’s disclosure is unlikely to be productive of the result sought by the applicant. *In re Gurley*, 27 F.3d 551, 553 (Fed. Cir. 1994); *see also KSR Int’l. Co. v Teleflex Inc.*, 127 S. Ct. at 1739–40 (explaining that when the prior art teaches away from a combination, that combination is more likely to be nonobvious).

sealant of the present invention which is required to stay fluid for a while after the ingredients are mixed. The sealant of the present invention is also different from the polyurethane/urea composition of Markusch et al. in that it does not contain an ATPE.

**Hannah et al.** (US 4,952,659) discloses bicyclic amidines such as 1,8-diazabicyclo[5.4.0]undecene-7 (DBU) and 1,5-diazabicyclo[4.3.0]nonene-5 (DBN) and their phenol or acid salts as catalysts for removing the blocking agent from an isocyanate-terminated prepolymer (column 4, lines 58-61). Because the polyisocyanate a) used in Markusch et al. is unlikely to be blocked as discussed later, one of ordinary skill in the art would not have been motivated to use the catalysts disclosed in Hannah et al. in the polyurethane/urea composition of Markusch et al.

Further, although the Examiner alleges that “Hannah et al. and Hagio et al. disclose suitable acids for the production of such acid-blocked catalysts” and that “it would have been obvious to use virtually any unsaturated acid that falls within the teachings of the secondary reference to block the catalyst of Markusch et al.” (emphasis added), Hannah et al. does not specifically disclose any unsaturated acids. Hannah et al. merely discloses that “The various derivatives or reaction products of the bicyclic amidine which can be utilized...as a catalyst include the reaction product of DBU or DBN with phenol, as well as with various other acidic compounds. Such acidic compounds include sulfonic acids such as p-toluenesulfonic, sulfimides, sulfamides, phosphonic acids, the various N-sulfonylcarboxamides,..., the various carboxylic acids which have a total of from 2 to 18 carbon atoms” (column 5, lines 18-27). Thus, Hannah et al. makes no distinctions between unsaturated acids and saturated acids and does not specifically disclose any of the claimed unsaturated aliphatic monocarboxylic acids. Further, in the Examples in Hannah et al., DBU and DBN are used only in the free form.

The Examiner has not given any reason why one of ordinary skill in the art would have chosen unsaturated aliphatic monocarboxylic acids from carboxylic acids which have a total of from 2 to 18 carbon atoms generically disclosed by Hannah et al. If there were any logic in the Examiner’s allegation, one of ordinary skill in the art would have expected that any acid that falls within the teaching of Hannah et al. would be useful for blocking the catalyst of Markusch et al. But this is not so.

As is evident from Comparative Examples 3, 4 and 6 in the present application, with the salts of DBU with 2-ethylhexanoic acid, p-toluenesulfonic acid and phenol, the effects of the present invention (i.e., a long pot life and a rapid viscosity increase) cannot be obtained. Thus, the use of the claimed aliphatic unsaturated monocarboxylic acids is advantageous over the other kinds of acid disclosed by Hannah et al. Because of this advantage, the use of the claimed aliphatic unsaturated monocarboxylic acids is not obvious from the combination of Markusch et al. with Hannah et al.

Looking forward, if there is the thought of again rejecting the claims of the present application again over Markusch et al. in view of Hannah et al, applicants must be given a rational reason why one of ordinary skill in the art would have used the claimed aliphatic unsaturated monocarboxylic acids (not any of the other kinds of acids disclosed by Hannah et al.), while neither Markusch et al. nor Hannah et al. gives any motivation for using the claimed aliphatic unsaturated monocarboxylic acids or suggests the advantages of their use at all.

**Hagio et al.** (US 4,524,104) relates to an adhesive composition and laminates thereof. Hagio et al. discloses, as the catalyst (C), a cycloamidine or acid addition salt thereof, but does not specifically disclose any of the claimed aliphatic unsaturated monocarboxylic acids as the acid useful for producing the acid addition salt.

Hagio et al. aims at providing an adhesive composition which can form products having excellent tackiness regardless of processing conditions and at providing a pressure-sensitive materials having improved storage stability (column 1, lines 30-36).

The cycloamidine compounds actually used as the catalyst (C) in the Examples in Hagio et al. are only DBU (Examples 1 and 2), DBU 2-ethylhexanoate (Example 3) and DBU phenolate (Example 4), yet DBU 2-ethylhexanoate and DBU phenolate are proven not to produce the effects of the present invention in Comparative Examples 3 and 6 in the present application. Because the adhesive composition of Hagio et al. necessarily contains a blocked polyisocyanate and hence needs heating for curing -- unlike the sealant of the present invention -- it is obvious that Hagio et al. does not suggest which of the cycloamidine salts disclosed in Hagio et al. catalyzes the urethane-forming reaction at ambient temperature in a manner desired in the present invention (i.e., in such a manner as to attain a long pot life and a rapid viscosity increase after the pot life).

Although the Examiner alleges that “Hannah et al. and Hagio et al. disclose suitable acids for the production of such acid-blocked catalysts” and mistakenly concludes that “it would have been obvious to use virtually any unsaturated acid that falls within the teachings of the secondary reference to block the catalyst of Markusch et al.” If there were any logic in this allegation, one of ordinary skill in the art would have expected that any acid that falls within the teaching of Hagio et al. would be useful for blocking the catalyst of Markusch et al. The Examiner have not given any reason why one of ordinary skill in the art would have been motivated to choose the claimed unsaturated aliphatic monocarboxylic acids from the numerous acids disclosed in Hagio et al. Because neither Markusch et al. nor Hagio et al. pays attention to the need for a long pot life and a rapid viscosity increase after the pot life, one of ordinary skill in the art would not have been motivated to choose the claimed aliphatic unsaturated monocarboxylic acids.

Thus, the present invention is not obvious from the combination of Markusch et al. and Hagio et al.

As explained above, even if Markusch et al. were combined with Hannah et al. and Hagio et al., one of ordinary skill in the art would not have been motivated to arrive at the sealant of the present invention, because none of the cited references discloses any of the claimed aliphatic unsaturated monocarboxylic acids. Further, even if one of the claimed aliphatic unsaturated monocarboxylic acids is used in the polyurethane/urea composition of Markusch et al. to block the catalyst of Markusch et al., such a composition is still different from the sealant of the present invention in that it necessarily contains c) a polyether containing at least two isocyanate-reactive groups such as an ATPE, which causes a viscosity increase immediately after mixing of the components a), b) and c). It is obvious that such a composition containing an ATPE cannot attain the long pot life required in the present invention.

Therefore, the present invention is not obvious from the cited references.

Applicants also wish to respond to item 7 of the Official Action.

Although the Examiner alleges that compositions of the type claimed inherently function as adhesives and adhesives of the type disclosed inherently function as sealants, the functions required for sealants and those required for adhesives are different, as already explained and this goes to the heart of how various components are or would be chosen. Although sealants and adhesives require some common properties, the properties required for adhesives are not exactly

the same as those required for sealants. Therefore, it is technically and logically incorrect to cite Markusch et al. relating to an adhesive, as the primary reference, because one of ordinary skill in the art trying to provide a sealant would have relied on a reference relating to a sealant, not an adhesive, as the primary reference.

The word “sealant” appears in each and every claim being examined; adhesive does not. Because it is not clear whether the polyurethane/urea composition of Markusch et al. satisfies all the requirements for sealants, one of ordinary skill in the art would not have relied on Markusch et al. as the primary reference.

Further, the Examiner alleges that “polyisocyanates, as understood within the art, encompass blocked isocyanates” and cites column 2, lines 33-35 of U.S. Patent 5,494,994 as evidence of this. However, applicants dispute this assertion and note that “Suitable polyisocyanates include blocked polyisocyanates such as  $\epsilon$ -caprolactam-blocked polyisocyanates and/or polyisocyanates which are free from blocking agents” which is the very indication that polyisocyanates, as understood within the art, do not encompass blocked isocyanates, because this special note is interpreted to mean that polyisocyanates usually do not encompass blocked isocyanates, the applicants of U.S. Patent 5,494,994 had to add this special note.

Further, as explained above, even though it is likely that the polyisocyanate a) used in Markusch et al. has to be unblocked, Markusch et al. just mentions the component a) as “polyisocyanate” and does not deliberately exclude blocked polyisocyanates. Because in Markusch et al., the required viscosity increase immediately after mixing components a), b) and c) is likely to be attained by the reaction of the polyether having containing at least two isocyanate-reactive groups such as ATPEs as the component c) with the polyisocyanate as the component a) (though it is not disclosed clearly), if the polyisocyanate a) were blocked, the required viscosity increase would not occur just by mixing the components a), b) and c) without heating.

Further, in the present application, the applicants do not just use the generic term “polyisocyanate”, and the polyisocyanate is restricted to specific species, MDI, TDI, MDI prepolymer and TDI prepolymer. Applicants respectfully submit it is totally wrong to interpret the specific species to include blocked versions.

Although the Examiner takes the position that “even if blocking agents are excluded, it is not seen that such an exclusion serves to overcome the prior art that utilizes blocked isocyanates, since one would reasonably expect from the teachings of the references and the general state of the art that the disclosed catalysts would catalyze the reaction of virtually any polyisocyanate-polyol reactant mixture”, again this view is totally incorrect, because if the polyisocyanate is blocked, the disclosed catalysts cannot catalyze the reaction of the polyisocyanate with a polyol at ambient temperature.

Finally, it is asserted that applicants’ claims and examples are not commensurate in scope in terms of reactants, catalyst species, acid species, quantities of reactants, quantities of catalyst, and ratios of catalysts to acid, and that the applicants’ results in Table 4 are derived from a specific prepolymer and polyol composition set forth within Table 3. However, the applicants have already explained this in detail in the extensive declaration evidence of record.

Therefore, the applicants doubt that anyone would make such an allegation if that person would have carefully considered and fully understood these declarations. If these declarations are considered and held to be in any way insufficient counsel should be pleased to know ) what experimental data would be commensurate in scope with the claims to rebut the alleged *prima facie* case of obviousness, and ( what claims are considered to be commensurate in scope in terms with of reactants, catalyst species, acid species, quantities of reactants, quantities of catalyst, and ratios of catalysts to acid.


For the above reasons it is respectfully submitted that the claims of this application define inventive subject matter. Reconsideration and allowance are solicited. Should the examiner require further information, please contact the undersigned.

KOMETANI et al  
Appl. No. 10/724,608  
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Respectfully submitted,

**NIXON & VANDERHYE P.C.**

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## Material Safety Data Sheet

Version 1.7

Revision Date 11/07/2008

MSDS Number 300000008803

Print Date 02/08/2009

### 1. PRODUCT AND COMPANY IDENTIFICATION

Product name : POLYCAT<sup>®</sup> SA-1 Catalyst

Chemical formula : C1522N20

Product Use Description : Epoxy Curing Agent

Manufacturer/Importer/Distributor : Air Products and Chemicals, Inc  
7201 Hamilton Blvd.  
Allentown, PA 18195-1501  
GST No. 123600835 RT0001  
QST No. 102753981 TQ0001

Telephone : 1-610-481-4911 Corporate  
1-800-345-3148 Chemicals Cust Serv  
1-800-752-1597 Gases/Electronics Cust Serv

Emergency telephone number (24h) : 800-523-9374 USA  
01-610-481-7711 International

### 2. COMPOSITION/INFORMATION ON INGREDIENTS

Components	CAS Number	Concentration (Weight)
Diazabicyclo(5.4.0)undec-7-ene phenol salt, 1,8-, (1:1)	57671-19-9	100 %

CHEMICAL FAMILY: Amine Salt

### 3. HAZARDS IDENTIFICATION

#### Emergency Overview

Corrosive  
Keep away from heat and sources of ignition.  
Severe skin irritant.  
Severe eye irritant.  
Harmful if swallowed.

#### Potential Health Effects

Inhalation : Inhalation of aerosol may cause irritation to the upper respiratory tract. Can cause severe eye, skin and respiratory tract burns.

Eye contact : Causes eye burns. May cause blindness. Severe eye irritation.

## Material Safety Data Sheet

Version 1.6  
Revision Date 10/22/2008

MSDS Number 300000008804  
Print Date 02/08/2009

### 1. PRODUCT AND COMPANY IDENTIFICATION

Product name : POLYCAT<sup>®</sup> SA-102 Catalyst

Chemical formula : C<sub>17</sub>H<sub>32</sub>N<sub>2</sub>O<sub>2</sub>

Product Use Description : Catalyst

Manufacturer/Importer/Distributor : Air Products and Chemicals, Inc  
7201 Hamilton Blvd.  
Allentown, PA 18195-1501  
GST No. 123600835 RT0001  
QST No. 102753981 TQ0001

Telephone : 1-610-481-4911 Corporate  
1-800-345-3148 Chemicals Cust Serv  
1-800-752-1597 Gases/Electronics Cust Serv

Emergency telephone number (24h) : 800-523-9374 USA  
01-610-481-7711 International

### 2. COMPOSITION/INFORMATION ON INGREDIENTS

Components	CAS Number	Concentration (Weight)
Diazabicyclo(5.4.0)-7-undecene, 1,8-, 2-ethylhexoate	33918-18-2	> 99%

CHEMICAL FAMILY: Amine Salt

### 3. HAZARDS IDENTIFICATION

#### Emergency Overview

Corrosive  
Severe skin irritant.  
Severe eye irritant.

#### Potential Health Effects

Inhalation : Can cause severe eye, skin and respiratory tract burns.

Eye contact : Causes eye burns. May cause blindness. Severe eye irritation.

Skin contact : Causes skin burns.

Ingestion : If ingested, severe burns of the mouth and throat, as well as a danger of



# Material Safety Data Sheet

Version 2.0  
Revision Date 06/11/2006

MSDS Number 300000008820  
Print Date 02/08/2009

## 1. PRODUCT AND COMPANY IDENTIFICATION

Product name : DABCO ® T-12 Catalyst  
Product Use Description : Polyurethane Catalyst  
Company : Air Products and Chemicals, Inc.  
7201 Hamilton Blvd.  
Allentown, PA 18195-1501  
Telephone : 1-800-345-3148 Chemicals  
1-800-752-1597 Gases and Electronic Chemicals  
Emergency telephone number : 800-523-9374 USA  
01-610-481-7711 International

## 2. COMPOSITION/INFORMATION ON INGREDIENTS

Components	CAS Number	Concentration (Weight)
Dibutyltin dilaurate	77-58-7	> 95%

CHEMICAL FAMILY: Organotin.

## 3. HAZARDS IDENTIFICATION

### Emergency Overview

Moderate respiratory irritant.  
Severe skin irritant.  
Severe eye irritant.

### Potential Health Effects

Inhalation : May cause nose, throat, and lung irritation. Inhalation of vapors and/or aerosols in high concentration may cause irritation of respiratory system.  
Eye contact : Severe eye irritation.  
Skin contact : Contact of undiluted product with skin quickly causes severe irritation and pain and may cause burns, necrosis and permanent injury.  
Chronic Health Hazard : This product contains no listed carcinogens according to IARC, ACGIH, NTP and/or OSHA in concentrations of 0.1 percent or greater. Prolonged contact may result in chemical burns and permanent damage.

### Exposure Guidelines

Target Organs : Respiratory system.  
Skin.  
Eyes.

**Material Safety Data Sheet**

Version 1.13

Revision Date 02/03/2008

MSDS Number 300000008661

Print Date 02/08/2009

**1. PRODUCT AND COMPANY IDENTIFICATION**

Product name : DABCO 33 LV® Catalyst

Product Use Description : Polyurethane Catalyst

Company : Air Products and Chemicals, Inc  
7201 Hamilton Blvd.  
Allentown, PA 18195-1501  
GST No. 123600835 RT0001  
QST No. 102753981 TQ0001

Telephone : 1-610-481-4911 Corporate  
1-800-345-3148 Chemicals Cust Serv  
1-800-752-1597 Gases/Electronics Cust Serv

Emergency telephone number : 800-523-9374 USA  
01-610-481-7711 International

**2. COMPOSITION/INFORMATION ON INGREDIENTS**

Components	CAS Number	Concentration (Weight)
Dipropylene glycol	25265-71-8	67 %
Triethylenediamine (TEDA)	280-57-9	33 %

CHEMICAL FAMILY: Tertiary Amines In Solvent.

**3. HAZARDS IDENTIFICATION****Emergency Overview**

Toxic by inhalation.  
Moderate skin irritant.  
Moderate eye irritant.  
Mild respiratory tract irritant.

**Potential Health Effects**

Inhalation : Toxic by inhalation. May cause nose, throat, and lung irritation. Inhalation of vapors and/or aerosols in high concentration may cause irritation of respiratory system.

Eye contact : Corneal edema may give rise to a perception of "blue haze" or "fog" around lights. Exposed individuals may see rings around bright lights. This effect is temporary and has no known residual effect. Product vapor can cause glaucoma (corneal edema) when absorbed into the tissue of the eye from the atmosphere. Causes eye irritation.

Skin contact : Causes skin irritation.